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the use of both kinds of microanalyser of the type designed to eliminate the effects of secondary scattering of the optical image in investigation, we are unable to see that such use would

the same considerations apply to claims 5-7. The examiner rejected those claims under § 103 on Herzog in view of Noda,² which shows the use of an ion mirror in a mass spectrometer. The board affirmed, stating that it would be obvious to substitute Noda's ion mirror in Herzog's device. That position again overlooks the optical features of appellants' microanalyser which are designed to preserve the image of the sample surface. Neither Herzog nor Noda, taken separately or together, disclose or render obvious those optical features, and we must accordingly reverse the board's rejection of claims 5-7.

The decision is reversed.

Court of Customs and Patent Appeals

In re Robins

No. 8313 Decided Aug. 13, 1970

PATENTS

1. Pleading and practice in Patent Office — Rejections (§54.7)

With respect to 35 U.S.C. 112, it is essential that specific requirement of statute on which rejection is based be clearly identified.

2. Specification — Sufficiency of disclosure (§62.7)

If rejection was intended under first paragraph of 35 U.S.C. 112, it must be reversed inasmuch as specification contains statement of applicant's invention which is as broad as applicant's broadest claims, and inasmuch as sufficiency of specification to satisfy "best mode" requirement of section 112 and to enable one skilled in the art to practice applicant's process as broadly as it is claimed has not been questioned.

¹U. S. Patent 3,126,477, issued March 24, 1964.

3. Specification — Sufficiency of disclosure (§62.7)

It may not be necessary, in order to support broad generic language in claim, that specification be equally broad in its naming, and in use of examples, of representative compounds encompassed by claim language; mention of representative compounds encompassed by generic claim language is not required by 35 U.S.C. 112 or any other provision of statute but, where no explicit description of a generic invention is found in specification, mention of representative compounds may provide an implicit description upon which to base generic claim language; representative examples are not required by statute and are not an end in themselves; rather, they are a means by which certain requirements of statute may be satisfied; thus, inclusion of a number of representative examples in specification is one way of demonstrating the operability of a broad chemical invention and, hence, establishing that utility requirement of section 101 has been met; it also is one way of teaching how to make and/or use claimed invention, thus satisfying that aspect of section 112.

4. Specification — Sufficiency of disclosure (§62.7)

35 U.S.C. 112 does not require that specification convince persons skilled in the art that assertions therein are correct.

5. Construction of specification and claims — Broad or narrow — In general (§22.101)

Claim language must be given its broadest possible meaning, in absence of special definitions by applicant.

Particular patents—Elastomers

Robins, Urethane Elastomers, claims 19 to 26 of application allowed; claims 27 and 28 refused.

Appeal from Board of Appeals of the Patent Office.

Application for patent of Janis Robins, Serial No. 199,644, filed June 4, 1962; Patent Office Group 140. From decision rejecting claims 19 to 28, applicant appeals. Affirmed as to claims 27 and 28, reversed as to claims 19 to 26.

DONALD M. SEIL and KENNETH ALEXANDER, SEIL, STEJOR & DELAHOYT, both of St. Paul, Minn. (JOHN H. LEWIS, JR., JOHN F. WITHERSPOON, and STEVENS, DAVIS,

MULLER & MOSHER, all of Arlington, Va., of counsel for appellant.
S. Wm. COCHRAN (R. E. MARTIN of counsel) for Commissioner of Patents.

Before WORLEY, Chief Judge, RECH, BALDWIN, and LANE, Associate Judges, and RICHARDSON, Judge, United States Customs Court, sitting by designation.
RECH, Judge.

This appeal is from the decision of the Patent Office Board of Appeals¹ affirming the rejection of claims 19-28 of application serial No. 199,644, filed June 4, 1962, entitled "Urethane Elastomers."

The claims on appeal are directed to a process for producing solid, non-cellular urethane polymers and to the resulting product. Appellant has discovered that "ionizable, halogen-free, monomergano mercuric compounds" are especially useful for catalyzing reactions between compounds having at least one reactive isocyanate group (-NCO) and compounds having at least one reactive hydroxyl group (-OH) to produce a solid, non-cellular polyurethane product. Appellant's contribution resides entirely in the catalyst used, the process being otherwise old. Referring to the catalyst useful in this process, appellant's brief states:

"This class of compounds may for convenience be characterized by the formula



wherein R¹ is an organo radical such as an alkyl or an aryl group joined directly to the mercury by a carbon-to-mercury bond, and X represents an organic or inorganic moiety joined to the mercury by some other bond than carbon ***; C₂H₅, oxygen in the case of a hydroxyl or acid moiety, nitrogen in the case of the ammonium salts, etc. By definition in the specification compounds which are monomergano-mercuric have "only one carbon-to-mercury bond" ***. [Emphasis ours.]

Appellant's brief also explains some of the advantages of the claimed process as follows:

"Appellant's invention is that certain classes of mercuric compounds selectively catalyze the secondary hydroxyl-isocyanate (OH-NCO) reaction, and promote it apparently to the substantial exclusion of the water-isocyanate (H₂O-NCO) reaction when small amounts of H₂O are present in the same reactive system with reactive OH groups ***. Since these classes of

mercuric compounds show no such selectivity when studying their effects in NCO-H₂O or NCO-OH reactive systems separately *** this selectivity could not be predicted. This discovery is of far reaching commercial importance since it results in the ability to mix monomeric organic polyisocyanates and organic polymeric polyols with one another to provide normally liquid systems for the direct conversion into polymeric elastomers having predictable cure times and reproducible final properties even in the presence of considerable moisture ***. This was not possible before because other prior known catalytic soluble compounds of metals were either found to indiscriminately promote the water-isocyanate reaction as well as the hydroxyl-isocyanate reaction or to be inhibited by water ***.

While the NCO-H₂O and NCO-OH reaction competition is encouraged in the formation of polyurethane foams as the carbon dioxide released in the reaction, NCO + H₂O → NHCONH + CO₂, constitutes the foaming agent, such competition is an anathema to the formation of non-cellular solid polyurethane rubbers or elastomers. In the latter instance the NCO + OH → NHCOO reaction is required to the exclusion of the NCO-H₂O reaction since the presence of gaseous reaction products causes bubbling or otherwise results in rubbers or elastomers having inferior physical properties ***. [Emphasis ours.]

Claims 19-26 are directed to the above-described process and claims 27 and 28 to the products of the processes of claims 23 and 25, respectively. Claims 19-21 and 27 are representative:

19. A process for accelerating the urethane linkage forming reaction between isocyanate and hydroxyl groups in the formation of a urethane product, said process comprising reacting an organic compound having at least one reactive isocyanate group with an organic compound having at least one reactive hydroxyl group in the presence of a catalytic amount of an ionizable, halogen-free, monomergano mercuric compound having a single carbon to mercury valence bond.

20. The process of claim 19 wherein said monomergano mercuric compound is a phenyl mercuric compound.

21. The process of claim 19 wherein said monomergano mercuric compound is a phenyl mercuric salt of a carboxylic acid.

27. A product made in accordance with the process of claim 23.

¹Consisting of Federico and Mangano, Examiners-in-Chief, and Retold, Acting Examiner-in-Chief, opinion by Mangano.

There are two prior art rejections under 35 U.S.C. 102 and 103, and at least one rejection under 35 U.S.C. 112. The latter rejection, which we consider first, was stated in the examiner's Answer as follows:

Claims 19-28 stand rejected under 35 U.S.C. 112 on the grounds that same are not supported by the disclosure and are unduly broad.

It is the examiner's position that appellant has not disclosed a suitable number of mercuric compounds falling within the scope of the claims to justify the language in the claims. Thus, the examiner is at a loss to figure out what compounds appellant intends to include with the scope of the claims. In the specification, appellant discloses two compounds which are recited on the claims [i.e., on which the claims read]: phenyl mercury acetate and phenyl mercury hydroxide.² On page 5 of the specification, appellant discusses in broad terms the catalyst contemplated.³ Note that appellant states that the "mono-organo" portion of the catalyst may be "alkyl" or "aryl." The only example of "aryl" is phenyl. There are no examples of "alkyl." Note that no particular meaning for "aryl" has been ascribed to in the specification. * * * In this regard, the instant case is similar to In re Sus * * * [49 CCPA 1301, 306 F.2d 494, 134 USPQ 301 (1962)]. The board's attention is directed to the discussion at 134 USPQ at 304, column 2 and 305, column 1. Note, also that in In re Sus several, and not just one example of "aryl" appeared in the specification. * * * The instant specification contains no examples of aryl. * * * the mono-organo portion of the catalyst is not limited to "aryl" and "alkyl." Thus an [sic, any?] organic radical is included within appellant's recitations. * * *

The salt portion of the mono-organo mercuric salt has not been given any particular meaning in the specification. Insofar as the recitation "salt of a car-

² As observed by the board, a third specific compound, phenyl mercury acetate, is also disclosed and encompassed by the claims.

³ The discussion to which the examiner here refers reads as follows:

Among this group [unreactive, halogen-free monomeric mercuric compounds] are organomercuric acetate, borate, benzoate, methacrylate, hydroxide, phthalate, gluconate, salicylate, octoate, stearate, etc.; the organo substituent may be an open or closed chain organic radical which is inert to isocyanate-active hydrogen reactions, as for example an aryl or alkyl group.

boxylic acid" in claim 21 is concerned, appellant has likewise failed to describe any particular meaning to the recitation. * * * In short, it is impossible to ascertain with any degree of reliability what compounds appellant intends to include within the meaning of the language presently appearing in the claims. In re Surrey * * * [54 CCPA 855, 370 F.2d 349, 151 USPQ 724 (1966).]

* * * In view of the fact that appellant has ascribed no particular meaning to the "mono-organo" and "salt" portions of his catalysts, it is submitted that the instant disclosure will not support the broad language of the claims. In re Sus, supra. [Emphasis ours.]

The board affirmed the examiner, stating in part:

The term "mono-organo" is indefinite, since it obviously is intended to include the "phenyl mercuric salt of a carboxylic acid" (claim 21), which has two organic groups, phenyl and carboxyl.⁴

Our review of the arguments presented leads us to agreement with the examiner's conclusion that the claims fail to comply with 35 U.S.C. 112. The term "mono-organo" is indefinite for the reason we have given above. Furthermore, we consider the term "organo" to be far broader than is warranted by the compounds disclosed, even including those rather generally given in the paragraph at the top of page 5 of the specification. The field of organic chemistry is too immense and catalytic action too uninterpretable to extrapolate phenyl even to aryl, much less to alkyl and then "organo." Precipitous in the form of such decisions particularly as In re Surrey [supra] * * * and In re Oppenauer, 31 CCPA 1248 * * * 143 F.2d 974, 62 USPQ 297 [(1944)], cited therein, are believed clear to this effect.

We find the examiner's Answer to be singularly unclear as to the particular requirement or requirements of § 112 which were thought not to have been met.⁵ The first, second and last sentences we have quoted from

⁴ This is unquestionably a criticism never raised by the examiner.

[1] Our consideration of this aspect would have been immeasurably simplified had the examiner merely referred to specific language in § 112, or at least to the paragraph in which it is to be found. Perhaps more so with respect to § 112 than with any other section of the statute, it is essential for the orderly resolution of issues that the specific requirement on which the rejection is based be clearly identified.

the examiner's Answer (see our emphasis) suggest that the *specification* was thought to be deficient (§ 112, first paragraph) in some unstated respect. From the remainder of the examiner's remarks, however, it appears that he could not ascertain "what compounds appellant intends to include within the scope of the claims," which amounts to a contention that the *claims* are indefinite (§ 112, second paragraph). The board continues to our uncertainty by first "agreeing" with the examiner that "the claims fail to comply with 35 U.S.C. 112" (second paragraph 2—emphasis ours) and then purportedly supporting this conclusion with observations about the immensity of the field of organic chemistry and the unpredictability of catalytic action (§ 112, first paragraph 2—§ 101?). From the board's second decision responding to a Request for Reconsideration, it is apparent that a § 101 rejection was not intended. There the board stated with respect to appellant's acknowledgment that "some chemist might find an inoperable organo-substituent":

Neither the examiner's holding nor our decision was on this basis, but rather they were based on the *lack of reasonable support* for the immense breadth of the claim terminology. [Emphasis ours.]

[2] If the examiner and/or the board intended a rejection under the first paragraph of § 112, it must be reversed inasmuch as the specification contains a statement of appellant's invention which is as broad as appellant's broadest claims, and inasmuch as the sufficiency of the specification to satisfy the "best mode" requirement of § 112 and to enable one skilled in the art to practice appellant's process as broadly as it is claimed has not been questioned.

[3] Both the examiner and the board seem to have taken the position that in order to "justify," as the examiner said, or to "support," as the board said, broad generic language in a claim, the specification must be equally broad in its naming, and use in examples, of representative compounds

⁵ Which reads in pertinent part:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same * * *

Which reads in pertinent part: The specification shall coincide with one or more claims particularly pointing out and distinctly claiming the subject matter which applicant regards as his invention.

encompassed by the claim language. This position, however, misapprehends the proper function of such disclosure. Mention of representative compounds encompassed by generic claim language clearly is not required by § 112 or any other provision of the statute. But, where no explicit description of a generic invention is to be found in the specification (which is not the case here) mention of representative compounds may provide an implicit description upon which to base generic claim language. See In re Sus, supra, cited by the examiner and discussed below. Similarly, representative examples are not required by the statute and are not an end in themselves. Rather, they are a means by which certain requirements of the statute may be satisfied. Thus, inclusion of a number of representative examples in a specification is one way of demonstrating the operability of a broad chemical invention and hence, establishing that the utility requirement of § 101 has been met. It also is one way of teaching how to make and/or how to use the claimed invention, thus satisfying that aspect of § 112. However, there has here been no contention by the Patent Office that any of these requirements has not been met. We therefore fail to attach any significance to the absence of representative examples.

In fairness to the examiner and the board, it is not difficult to see how they might have been led by the Sus, Surrey, and Oppenauer cases, which they cited, to take the position which they appear to have taken. These cases, however, are readily distinguishable from the present case.

In Sus, appellant used the terms "aryl and substituted aryl radicals" or "substituted and unsubstituted aryl radicals" in his claims. However, we found nothing in the way of express statements or examples in the specification that would teach one skilled in the art that "all aryl and substituted aryl radicals" were properly within the subject matter which appellants considered to be their invention.⁶ Accordingly we held that the claims were broader than the disclosure.⁷ (In this regard see note 4 of the opinion.) In the present case, there are express statements of appellant's inven-

⁶ In Sus the rejection was based on the second paragraph of § 112. For the reasons given in In re Halberstam, 57 CCPA 422, 422 F.2d 911, 164 USPQ 647 (1970); In re Bokroski, 57 CCPA 946, 422 F.2d 904, 164 USPQ 642 (1970); and In re Wakefield, 57 CCPA 959, 422 F.2d 897, 164 USPQ 636 (1970), such rejections are more properly considered under the first paragraph of that section.

tion which are as broad as his claims, and thus therefore is not in point.

In *Surry*, where the issues were (1) sufficiency of the disclosure to teach "how to use" the claimed compounds (§ 112, first paragraph) and (2) sufficiency of the *proof* that the compounds were in fact useful (§ 101), we stated, 151 USPQ at 730:

[A]ppellant here has failed to provide those of ordinary skill in the art, the Patent Office and this court, reasonable assurance, as by *adequate representative examples*, that the compounds falling within the scope of the claim will possess the asserted usefulness. [Emphasis ours.]

[4] Since § 112 does not require that a specification *convince* persons skilled in the art that the assertions therein are correct and since the above statement says "as by adequate representative examples" (emphasis ours), it *cannot* be reasonably inferred from *Surry*, that the mentioned assurance *must* be provided by examples in the specification as opposed, for example, to affidavits as provided for by Rule 132. Since neither of the issues in *Surry* is raised here, this case also is not in point.

In *Oppenauer*, somewhat as in *Sus*, several materials were recited more broadly in the claims than they were disclosed in the specification. As in *Surry*, the sufficiency of the "how to use" disclosure of the specification was questioned and the court held that the specification did not contain a teaching that all of the materials of one type recited in the claims were "capable of accomplishing the desired result." We do not have a comparable situation here.

We turn now to the possibility that the examiner intended a rejection of the claims as being indefinite (§ 112, second paragraph). The examiner points out that appellant does not ascribe any *special* meaning to terms such as "organo" and "salt of carboxylic acid" and to the "salt" portion of his catalyst. From this he concludes that

it is impossible to ascertain with any degree of reliability what compounds appellant intends to include within the meaning of the language presently appearing in the claims.

[5] The examiner, however, was able to state, "Thus an [sic, any ?] organic radical is included within appellant's recitations." He also cited four foreign patents⁹ to show various radicals which he apparently con-

⁹ Australian, 160,814, Jan. 1955; Australian, 208,961, June 1957; British, 692,953, June 1953; and Canadian, 706,906, Mar. 1965.

sidered to be rather exotic and which the terms used in the claims would encompass in the absence of special meanings. This ability of the examiner to enumerate radicals encompassed by the claim language points up, we think, the weakness of the indefiniteness argument. Giving the language its broadest possible meaning, as we are bound to do in the absence of special definitions by appellant, the breadth of the claims insofar as the catalyst is concerned is indeed immense.

However, "Breath is not indefiniteness." In re Gardner, 57 CCPA _____, 427 F.2d 786, 166 USPQ 138 (1970).

Apparently interpreting the "mono-organo" as limiting the number of organic radicals possible in appellant's catalyst to one, the board held this expression to be indefinite because

it obviously is intended to include the "phenyl mercuric salt of a carboxylic acid" (claim 21), which has two organic groups, phenyl and carboxyl.

Appellant's specification, however, makes it perfectly clear that it is the number of carbon-to-mercury bonds, rather than the number of *organo groups*, that is restricted to one by the "mono" in the expression "monorgano mercuric compound." Thus the specification states:

Presently preferred divalent mercury containing compounds are the *** ionizable mono-organo-mercuric compounds (which contain only one carbon-to-mercury bond). [Emphasis ours.]

The sense in which appellant uses the expression "monorgano mercuric compound" is also consistent with the following definition from Hackl's Chemical Dictionary (3rd ed.), cited by both appellant and the solicitor:

organometallic. Pertaining to the carbon-metal linkage. o. compounds. A class of compounds of the type R-M, where R is an alkyl or aryl radical and M is a metal, e.g., PbEt₄, tetraethyl lead; R-Alg-X, alkyl-magnesium-halide. [Emphasis ours.]

In its second opinion the board noted that appellant's use of the phrase "having a single carbon to mercury valence bond" in some of the claims to qualify the expression "monorgano mercuric compound" creates somewhat of a redundancy since in the specification the former expression is used to define the latter. We find, however, that rather than rendering the claims indefinite, this redundancy merely removes any question as to the meaning of the latter expression.

We therefore cannot agree with the board's reasons for holding appellant's claims indefinite.

There remain for our consideration two prior art rejections. The references relied on are:

Windemuth et al. 3,073,702 Jan. 15, 1963 (filed Oct. 22, 1959)
Kaesner et al. 3,136,732 June 9, 1964 (filed Oct. 7, 1960)
Journal of Applied Polymer Science, Vol. IV, No. 11, pp. 207-11 (1960)

The examiner rejected all the claims under 35 U.S.C. 103 as "unpatentable over the combination of Kaesner *** and Journal of Applied Polymer Science" (hereinafter "JAPS"), and claims 27 and 28 under 35 U.S.C. 102 as "fully met by Windemuth."

Windemuth et al. ("Windemuth") relates to the production of polyurethane products from isocyanates and polyethers using catalysts which differ from those used by appellant. Windemuth discloses that the best results are obtained from divalent or tetravalent tin compounds, e.g., stannic chloride and diethyl tin diacetate.

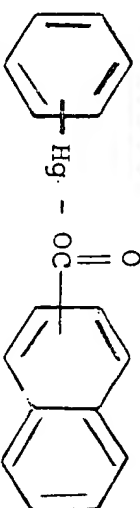
Kaesner et al. ("Kaesner") discloses a process of making polyurethanes in which the catalyst is a metal naphthalene. Mercury

naphthalene is disclosed as being preferred.¹⁰ The JAPS article reports the results of a study in which the catalytic activities of a wide variety of metallic compounds for isocyanate-hydroxyl reactions were determined. The article states:

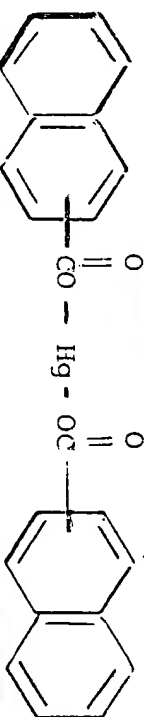
A list of the type compounds in a roughly descending order of catalytic activity is Bi, Pb, Sn, triethylenediamine, strong bases, Ti, Fe, Sb, U, Cd, Co, Th, Al, Hg, Zn, Ni, trialkylamines, Ce, Mo, V, Co, Mn, Zr, and trialkyl phosphines. [Emphasis ours.]

Diphenyl mercury appears to have been the only mercury compound tested.

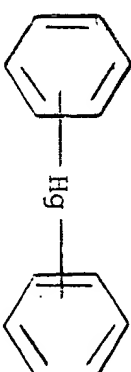
The examiner explained the rejection of all the claims on Kaesner and JAPS as follows: The claims in the instant application are directed to the use of a mono-organo mercury compound having a single carbon-mercury bond as catalysts for the preparation of polyurethanes. Included within the scope of appellant's mercury compounds is phenyl mercury naphthalene. The structural formula of phenyl mercury naphthalene is:



mercury naphthalene has the following structural formula:



JAPS discloses the use of diphenylmercury as a catalyst for the preparation of polyurethanes. *** The structural formula of diphenylmercury is:



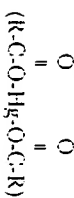
Phenyl mercury salts of carboxylic acids are known in the art. *** Appellant does not challenge this position.

The Board is invited to compare the structural formulae of the prior art catalysts and appellant's catalyst. Moreover, the

¹⁰ Appellant challenges the availability of Kaesner on the basis of a parent application filing date. The Patent Office denies his right to rely on the parent. We find it unnecessary to consider this issue since we find the rejection based on this reference to be unsound on other grounds.

position that one skilled would find it obvious to use phenyl mercuric naphthenate as a catalyst for producing polyurethanes. From the foregoing it will be seen that the mercuric naphthenate of Kaesner contains an $-O-Jlg-O-$ linkage, the diphenyl mercuric catalyst of JAPS a $-C-Hg-C-$ linkage, and appellant's compounds a $-C-Hg-X-$ linkage, where "X" typically may be oxygen as in phenyl mercuric naphthenate.

Appellant argues that his monoorgano-mercuric compounds (R-Hg-X) are of a different class than the diorgano-mercuric compounds (R-Hg-R) represented by the diphenyl mercuric of JAPS and the mercuric salts of carboxylic acids



represented by the mercuric naphthenate of Kaesner. Appellant also points out differences in the catalytic action of the three classes of compounds. Specifically he notes that JAPS shows lead octoate (which JAPS reports as being one of the most active catalysts tested) to be 40 times more active than diphenyl mercuric as a catalyst for isocyanate-hydroxyl reactions, while appellant's specification establishes lead octoate to be about comparable to his monoorgano-mercuric compounds under anhydrous conditions but much worse in the presence of even 0.1% of moisture. Comparing his mono-organo mercuric compounds with the mercuric salts of carboxylic acids, such as the mercuric naphthenate disclosed in Kaesner, appellant urges that the former are "more potent catalysts" and possess "the further unexpected advantage, in the casting of one-shot rubbers, of enabling the liquid and pourable mixture which cures to the rubber to stay liquid and pourable for a long period of time while still not increasing the total gelation time ***"

Although we do not find the latter advantage to be substantiated in the record, comparative examples in appellant's specification do support the conclusion that the monoorgano mercuric compounds are the more potent catalysts. Having considered all the arguments and evidence of record and the board's observation about the unpredictability of catalytic action, we conclude that the rejection based on Kaesner and JAPS must be reversed.

We affirm, however, the rejection of product-by-process claims 27 and 28 under 35 U.S.C. 102 on Windemuth which discloses the production of polyurethanes using various tin compounds as catalysts. The examiner took the position that the claimed

products and certain of the polyurethane products of Windemuth would not differ materially. Appellant submitted a Rule 132 affidavit containing comparisons of the physical properties of polyurethanes produced using stannic chloride, dibutyl tin chloride, and phenyl mercuric acetate, the first two being disclosed in Windemuth and the last being one of appellant's catalysts. The examiner criticized the affidavit because of appellant's choice of tin compounds disclosed in the reference. He felt that a tin compound containing both salt groups and carbon-metal groups, such as dibutyl tin dilaurate disclosed in Windemuth, would have been more similar in structure to appellant's catalysts and therefore should have been used in the comparison.¹¹

Appellant attempts to defend his choice by pointing out that the reference discloses stannic chloride as being a preferred catalyst. However, in considering this rejection, we are not concerned with superiority of the catalysts but rather with differences, if any, in the products produced. We agree with the examiner that to be persuasive the affidavit should have included in the comparison a product obtained using a catalyst more similar in structure to appellant's catalysts.

In summary, we reverse the rejections under § 112 and § 103 and affirm the rejection under § 102.

Accordingly, the decision of the board is reversed as to claims 19-26 and affirmed as to claims 27 and 28.

WOLEY, Chief Judge, took no part in the decision of this case.

Court of Customs and Patent Appeals

In re HOSTETTLER AND PROOPS
No. 8283
Decided Aug. 20, 1970

PATENTS

Particular patents—Polyurethane

Hostettler and Proops, Stabilized Polyurethane Composition, claims 1 to 3, 9, and 10 of application refused.

¹¹ Dibutyl tin dilaurate was compared with phenyl mercuric acetate in one example of appellant's specification, but the example is concerned only with the effect of water on catalytic activity and no details are given as to the properties of the products.

Appeal from Board of Appeals of the Patent Office.

Application for patent of Fritz Hostettler and William K. Proops, Serial No. 509,427, filed Nov. 23, 1965; Patent Office Group 140. From decision rejecting claims 1 to 3, 9, and 10, applicants appeal. Affirmed.

CHARLES J. METZ, PAUL A. ROSE, and LOUIS C. SMITH, JR., all of Washington, D.C., for appellants.

JOSEPH SCHMAYER (JACK E. AKERRE of counsel) for Commissioner of Patents.

Before RICH, ALMOND, BARLOWY, and LANE, Associate Judges, and ROSENSTERN, Judge, United States Customs Court, sitting by designation.

LANE, Judge.

This appeal is from the decision of the Patent Office Board of Appeals affirming the rejection of claims 1-3, 9 and 10 of application serial No. 509,427, filed November 23, 1965,¹ for "Stabilized Polyurethane Composition." We affirm.

The invention relates to a method of stabilizing certain foamed polyurethane compositions against oxidative degradation occurring at elevated temperatures, as reflected in representative claim 1:

1. In a method for preparing urethane foams wherein a polyether polyol having a molecular weight of at least 250 and containing at least two active hydrogens as measured and determined by the Zerewitinoff method is reacted with an organic polyisocyanate in admixture with an organic tin catalyst and a blowing agent, the improvement which comprises providing in the reaction mixture a phenolic compound containing a polyhydroxyaryl radical in which at least two hydroxyl groups are directly attached to an aromatic nucleus in a vicinal position, which compound is provided in an amount of from about 0.001 to about 0.5 per cent by weight of said mixture, whereby said improvement imparts to said urethane foams enhanced resistance to degradation caused by said organic tin catalyst.

It appears from the specification that the advantages of using organic tin catalysts in polyurethane polymerization processes are offset to a certain extent by the fact that those catalysts tend "to promote deterioration" of polyether-based urethane foams at

elevated temperatures of 130°C., occurring during the cure cycle, with concomitant loss of tensile strength, elongation and other desirable physical properties. The specification states:

*** it appears that the deterioration of polyether-based urethane foams at elevated temperatures is due to an oxidative degradation which results from an attack on polyether linkages by free radicals produced from the organic tin catalyst during the curing cycle of the foam.

Appellants found that addition to the reaction mixture of certain amounts of phenolic compounds in which at least two hydroxyl groups are attached to the aromatic nucleus in a vicinal or adjoining position as recited in the claims, e.g., catechol and derivatives thereof, would effectively prevent deterioration of the foamed product and loss of desired physical characteristics.

The examiner rejected the claims under 35 U.S.C. 103 as obvious over Braun² in view of Mobay.³ Braun discloses that polyurethane foams, prepared by reacting polyethers or polyesters with diisocyanates in the presence of a tertiary amine catalyst, can be stabilized against deterioration caused by light and oxidation by adding .05-10%, preferably 1-2%, of various polyhydroxyaryl derivatives (such as hydroquinone, catechol, and certain catechol derivatives) to the reaction mixture. Cured polyurethane foam samples stabilized in the above manner exhibited little or no color change, brittleness, or loss of strength when subjected to accelerated aging tests involving irradiation by a carbon arc lamp at 75°C. in a fadeometer for a day or more. Noting that Braun conducts his polymerization process in the presence of a tertiary amine catalyst rather than an organic tin catalyst, the examiner turned to Mobay, who discloses little more than what appellants acknowledge to be known in the art—namely, that certain organic tin compositions are suitable catalysts for the polymerization of polyethers with polyisocyanates to form polyurethane foam. The examiner held:

The claimed subject matter is considered to be obvious to one skilled in the art in view of the teachings [of] Braun et al. and Mobay. It is evident, in view of the teachings of Braun et al., that polyurethane foams are subject [to] deterioration caused

² German Auslegeschrift No. 1,042,889, November 6, 1958.

³ A company publication entitled "A One Shot System for Flexible Polyether Urethane Foams", November 10, 1958.

¹ As a continuation-in-part of serial Nos. 293,905 and 24,644, filed July 9, 1963 and April 26, 1960, respectively.